REMARKS

Applicant respectfully requests the Examiner's reconsideration of the present application, as amended.

Summary of Office Action

Claims 1-16 are pending.

The abstract was objected to.

Claims 1-8, 11-12 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,881,130 of Zhang ("Zhang") in view of U.S. Patent No. 6,092,927 of Clemente ("Clemente").

Claims 13-16 were rejected under 35 U.S.C. § 103 as being unpatentable over Zhang in view of U.S. Patent No. 4,982,307 of Patel ("Patel").

Claims 9-10 were indicated as being allowable if rewritten.

Summary of Amendments

Claim 1 was amended. Applicant submits that the amendments to claim 1 do not add new matter.

Response to the objection to the Abstract

The Examiner objected to the Abstract. In particular, the Examiner cited MPEP § 608.01(f) [sic 608.019(b)] as authority for reducing the abstract to 150 words or less (06/18/2003 Office Action, p. 2).

Applicant respectfully notes 1) the Abstract is 224 words long; 2) the application was filed November 16, 1999 at a time when the requirement for the Abstract was 250

words or less; 3) the Abstract was within the word count limit in effect at the time of filing; 4) the requirement referred to by the Examiner is not properly applied to applications filed before September 8, 2000 (the date the rule was made final, see 65 FR 54667).

Applicant respectfully requests that the objection to the Abstract be withdrawn. The Abstract complied with the rule 37 C.F.R. § 1.72(b) in effect at the time the application was filed and it is improper to retroactively apply the amended 37 C.F.R. § 1.72(b) that was not in effect until 10 months after the present application was filed.

Response to 35 U.S.C. § 103 rejections

Claim 1-8, 11-12, and 13-16 were rejected under various combinations of Zhang, Clemente, and Patel.

Applicant respectfully submits *none of the cited references, alone or combined, teaches or suggests 1) estimating an instantaneous power dissipation of the linefeed component using the sampled line voltage and line current from one of a tip and a ring line of a subscriber loop; and 2) filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component.*

Zhang includes a disclosure of methods and apparatus for determining the presence of load coils attached to a telephone line. A stimulus waveform comprised of the sum of samples of sine waves of various frequencies is applied to the telephone line. The current and voltage of the line are sampled and a Fourier transform is performed to enable computing auto and cross power spectra of the current and voltage. The power spectra are used to compute the line impedance as a function of frequency. Peaks or sign

changes in the line impedance are indicative of the presence of one or more load coils. (Zhang, col. 2, lines 29-46; col. 7, lines 18-37; col. 8, lines 53-67).

Applicant submits Zhang teaches away from calculating an instantaneous power. (The power spectrum is a frequency domain expression that is not equivalent to instantaneous power dissipation a time domain expression) Applicant notes that Zhang is concerned with detecting the presence and possibly the number of load coils that may be present on the subscriber line. Zhang is thus not concerned with determining instantaneous power dissipation or junction temperatures of linefeed components.

Clemente includes a disclosure of temperature detection of semiconductors performed by co-packaged analog integrated circuit. The voltage across and the current through a power semiconductor are determined. The temperature of the analog integrated circuit is determined. The temperature of the power semiconductor is calculated from the power semiconductor voltages and currents and the temperature of the co-packaged analog integrated circuit along with a number of other temperature parameters. (Clemente, col. 2, lines 25 thru col. 3, line 55)

Clemente does not teach or suggest 1) estimating an instantaneous power dissipation of a linefeed component using the sampled line voltage and line current from one of a tip and a ring line of a subscriber loop; and 2) filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component. Applicant respectfully submits that Clemente does not teach or suggest that the power semiconductor forms any part of a subscriber loop or a linefeed component for a subscriber loop. Applicant notes that Clemente's temperature

calculations are largely dependent upon knowledge of the temperature of a co-packaged analog circuit.

Patel includes a disclosure of a thermal protection circuit for an integrated circuit subscriber line interface. A transistor circuit is provided for generating a power turnoff signal (TRHZ) when the temperature of the transistor circuit exceeds a pre-determined design temperature. (Patel, col. 7, lines 4 - 43; Figs. 1-3)

Applicant respectfully submits Patel does not teach or suggest sampling the tip or ring lines of the subscriber loop, estimating instantaneous power dissipation, or filtering the estimated instantaneous power dissipation to calculate a junction temperature of a linefeed component.

Thus applicant submits that none of the references alone or combined teaches or suggests: *1) estimating an instantaneous power dissipation of the linefeed component using the sampled line voltage and line current from one of a tip and a ring line of a subscriber loop; and 2) filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component.*

In contrast, claim 1 includes the language:

> 1. A method comprising the steps of:
> a) *sampling at least one of a tip and a ring signal to determine a line voltage and a line current of a linefeed component of a subscriber loop;*
> b) *estimating an instantaneous power dissipation of the linefeed component;* and
> c) *filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component.*

(Claim 1, as amended)(*emphasis added*)

> 5. A method comprising the steps of:
> a) selecting a selected linefeed component of a plurality of linefeed components coupled to a subscriber loop having a tip signal and ring signal;

b) *sampling at least one of the tip and the ring signals to determine a voltage and a current associated with the selected linefeed component;*

c) *estimating an instantaneous power dissipation of the selected linefeed component;* and

d) *filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the selected linefeed component.*

(Claim 5)(*emphasis added*)

7. A subscriber loop signal processor apparatus, comprising:

an analog-to-digital converter (ADC) for sampling at least one of a tip and a ring signal;

a power calculator coupled to calculate an instantaneous power dissipation of a selected linefeed driver component from the sampled signal and control currents provided to a plurality of linefeed driver components; and

a filter providing an estimated junction temperature of the selected linefeed driver component from the instantaneous power dissipation.

(Claim 7)(*emphasis added*)

Thus applicant respectfully submits claims 1, 5, and 7 are patentable under 35 U.S.C. § 103 in view of the cited references.

Claims 13-16 were rejected as being unpatentable in view of Zhang and Patel. The Examiner relies upon Patel for the teaching of a fuse circuit. The Examiner has stated:

> Patel teaches taking a first voltage measurement before the fuse location and a second voltage measurement after the fuse for the TIP circuit. Since the fuse contains a constant resistance, the different in the two voltage measurements is proportional to the TIP current. A similar thing hold for RING measurements. [Fig. 3; col. 6, lines 28-62]

(06/18/2003 Office Action, p. 7)

Applicant traverses the Examiner's characterization of Patel. The cited portions of Patel relate to the Power Down and Thermal Shut-Down circuit 131. Circuit 131 does not drive or sense either of the TIP or RING lines. Indeed circuit 131 provides the TRHZ signal independently of any TIP or RING currents. Circuit 131 is wholly independent of

the TIP-RING fuse 34 previously identified by the Examiner. Patel's "TIP-RING fuse circuit 34" is a detector that places the tip and ring drivers into a high impedance mode. This turns off the tip and ring drive amplifiers to remove current from the subscriber loop. (Patel, col. 5, line 2-10). Applicant submits that Patel does not teach "taking a first voltage measurement before the fuse location and a second voltage measurement after the fuse for the TIP circuit" as alleged by the Examiner.

Applicant respectfully requests the Examiner to indicate with specificity any support for sampling the tip and ring lines both before and after a fuse. Applicant respectfully submits that Patel's input lines RPT, RPR are not "fused" thus they are not sampled before and after a fuse.

Thus applicant submits the cited references do not teach or suggest generating subscriber loop control signals in response to a sensed tip signal and a sensed ring signal of a subscriber loop, wherein the tip and ring signals are sensed before and after a fuse.

In contrast claim 15 includes the language:

> 15. A method comprising the steps of:
>
> generating subscriber loop control signals in response to a sensed tip signal and a sensed ring signal of a subscriber loop, *wherein the tip signal is sensed before and after a tip fuse, wherein the ring signal is sensed before and after a ring fuse*; and
>
> driving the subscriber loop in accordance with the subscriber loop control signals.

(Claim 15)(*emphasis added*)

Thus applicant respectfully submits claim 15 is patentable under 35 U.S.C. § 103 in view of the cited references.

With respect to claims 13 and 16, applicant respectfully submits that *none of the references alone or combined teaches or suggests 1) a linefeed driver including a tip fuse*

series-coupled to the tip line and a ring fuse series-coupled to the ring line, or 2) that the sensed tip signal *includes first and second sampled tip voltages sampled from opposing sides of the tip fuse, wherein the sensed ring signal includes first and second sampled ring voltages sampled from opposing ends of the ring fuse.*

To the contrary, none of the cited references teach or suggest tip/ring series-coupled fuses or sampling the sensed tip and ring signals on both sides of any fuse.

In contrast claims 13 and 16 include the language:

> 13. A subscriber loop interface circuit apparatus comprising:
> a signal processor having sense inputs for sensing a tip line and a ring line of a subscriber loop, the signal processor generating subscriber loop control signals; and
> a linefeed driver for driving the subscriber loop in accordance with the subscriber loop control signals, *the linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line, wherein the sensed tip signal includes first and second sampled tip voltages sampled from opposing sides of the tip fuse, wherein the sensed ring signal includes first and second sampled ring voltages sampled from opposing ends of the ring fuse.*

(Claim 13)(*emphasis added*)

> 16. A subscriber loop interface circuit apparatus comprising:
> a signal processor having sense inputs for sensing a tip line and a ring line of a subscriber loop, the signal processor generating subscriber loop control signals; and
> a linefeed driver for driving the subscriber loop in accordance with the subscriber loop control signals, *the linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line,* wherein the tip line and ring line are each sensed at two locations to determine both a status of each fuse and a power dissipation of each linefeed driver component.

(Claim 16)(*emphasis added*)

Thus applicant respectfully submits claims 13 and 16 are patentable under 35 U.S.C. § 103 in view of the cited references.

As stated above, claims 1, 5, 7, 13, 15, and 16 are patentable under 35 U.S.C. § 103 in view of the cited references. Given that claims 2-4 depend from claim 1; claim 6 depends from claim 5; claims 8-12 depend from claim 7; and claim 14 depends from claim 13, applicant submits claims 2-4, 6, 8-12, and 14 are likewise are patentable under 35 U.S.C. § 103 in view of the cited references.

Applicant respectfully submits the rejections under 35 U.S.C. § 103 have been overcome.

Conclusion

In view of the arguments presented above, applicants respectfully submit the applicable rejections and objections have been overcome and that claims 1-16 as amended should be found to be in condition for allowance.

If there are any issues that can be resolved by telephone conference, the Examiner is respectfully requested to contact the undersigned at **(512) 306-9470**.

Respectfully submitted,

Date September 22, 2003 William D. Davis

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